

- Ctenidia of abdominal tergites composed of small spines which are not in close-set rows; genal ctenidium of 6-7 spines; nearctic..... 2.
2. Pronotal ctenidium of 46 spines; body of receptacula seminis more than 210 μ long..... *schefferi* Chapin.
 Pronotal ctenidium of 36-38 spines; body of receptacula seminis less than 210 μ long..... 3.
3. Body of receptacula seminis 184-199 μ long; nine bristles in upper row on frons..... *mammoth* Chapin.
 Body of receptacula seminis 169 μ long; seven bristles in upper row on frons..... *dippiei* Rothsch.

For convenience, the exact dimensions of the receptacula seminis in the three species before me are given in the following table. As there are two receptacula in each female in the species of this genus, two columns of dimensions have been given. All measurements given in micra.

Species	Anterior	Posterior
<i>H. schefferi</i> Chapin.	215 x 123	230 x 138
<i>H. mammoth</i> Chapin.	199 x 138	184 x 154
<i>H. dippiei</i> Rothsch.	169 x 108	169 x 108

SOME NEW ORTHOPTERA FROM MOKANSHAN, CHINA.

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Among a consignment of Orthoptera recently received for determination from Prof. N. Gist Gee, of Soochow, China, were several forms apparently undescribed. All of these are from Mokanshan, China, and descriptions of them are here given. Types and allotypes are retained in the collection of the U. S. National Museum and the paratypes are divided, some being retained in that collection and some returned to Prof. Gee.

Megaulacobothrus, n. gen. (Truxalinae).

Agreeing closely with the characters given by Bolivar for his genus *Aulacobothrus* except that the inner calcaria of the posterior tibiae are equal. The species is decidedly larger however than any of those placed in the above genus by its author, and there is probably little relation between the two genera, in spite of the similarity of characters.

Description, male and female.—Vertex moderately acute in both sexes, somewhat more so in the male; above slightly convex and without median carina; fevolae distinct, wholly visible from above, about three times as long as broad in the male and slightly less in the female; antennae filiform, those of the male more than twice as long as the head and pronotum combined, those of the female scarcely twice as long; frontal costa nearly flat, somewhat concave at the ocellus, the sides converging almost uniformly, sometimes more rapidly towards the

vertex in the male, the point where it meets the vertex being narrower in the male than in the female, in the former not, or barely, broader than the basal segment of the antennae; face moderately declivous. Pronotum with distinct median and lateral carinae, the former cut at, male, or a little behind, female, the middle by the principal transverse sulcus, which also cuts the lateral carinae; lateral carinae converging in the anterior third and then diverging to the posterior margin of the pronotum, the broadest part of the disk being about twice as broad as at the narrowest point; anterior margin of pronotal disk truncate, posterior margin obtuse-angulate; lateral lobes quadrate. Organs of flight fully developed, the tegmina and wings of equal length, extending to, or barely beyond, the tips of the posterior femora; tegmina of the male with the costal area decidedly broadened, the transverse veins parallel and diagonal, growing more transverse towards the apex of the area; intercallary area subequal in width, about as broad as the ulner area at its widest point, intercallary vein absent; wings less than twice as long as broad, the margins evenly rounded, as a whole, but with moderate undulations between each radiate vein, a more decided notch at the terminus of the first one. Legs moderately slender; posterior femora flattened on the outer face, the carinae well elevated; posterior tibiae with the inner apical calcars equal in length and scarcely more than half as long as the inner ones, and similarly shaped. Abdomen moderately compressed; supraanal plate apically pointed, more so in the male, the sides somewhat rounded; subgenital plate of male apically pointed and directed upwards, that of the female flat and horizontal and apically narrowly cleft; cerci of both sexes conical, somewhat more elongate in the male; valves of ovipositor short, free, the margins smooth.

Type.—*Megaulacobothrus fuscipennis* Caudell.

In the key to genera of the Truxalinae given by Bruner¹ this genus falls under *Stenobothrus* on page 122. But it is amply distinct from that genus.

***Megaulacobothrus fuscipennis*, n. sp.**

Description, male and female.—Size large. Head as broad as the anterior portion of the pronotum; eyes elongate, apically pointed above, reddish brown, unicolorous; occiput without carina but with a mesial light stripe bordered on each side by a black one, and below that, on each side, with one or two more alternate black and lighter stripes, varying in distinctness in different specimens; antennae dark brown, often lighter basally, and consisting of about twenty-five or twenty-six segments in the male, all but the apical four or five, which are very small and short, being elongate; in the female probably of about the same number of segments, though in the only entire antenna of this sex examined the apical ones are fused into one long indistinctly divided segment. Pronotum light brown in color, the disk with the lateral carinae marked in yellow and margined outwardly along the middle and inwardly behind with fuscus; lateral lobes with some obscure light colored callouses. Abdomen blackish above and laterally at the base, the black giving way laterally along the middle to yellowish and the apical

¹"Revision du Systeme des Orthopteres et description des especes rapportees par M. Leonardo Fea de Birmania" (Ann. Mus. Civ. Stor. Nat. Genova, Vol. xxxiii (2a, xiii), p. 1-230, pl. i-vi (1893).

half blood-red, especially above and laterally, beneath the yellowish cast continuing further towards the tip. Fore and middle legs brown, the tibiae only armed with small black teeth on each side below; hind femora brown on the outer face, sometimes with a little darker marking along the middle anteriorly, the geniculation blackish, the inner face light brown with one or two strongly diagonal black bands, and below merging into the color of the ventral surface, which is uniformly blood red; posterior tibiae blood red with black tipped spines, about a dozen to fourteen on each dorsal carina. Nymph without special features different from the adult except that the abdomen is not red and the hind tibiae are infuscated in the middle half.

Length, antennae, male, 15 mm., female, 14 mm.; pronotum, male, 5 mm., female, 6 mm.; elytra, male, 20 mm., female, 23 mm.; posterior femora, male, 16 mm., female, 18.5 mm.

Described from six males, type and paratypes A to E, four females, allotype and paratypes F to H, and one male nymph, paratype I.

Type, allotype and paratypes, A, B, C, F, G and I in Collection U. S. National Museum; paratypes D, E and H returned to Prof. Gee.

Catalogue No. 22971, U. S. N. M.

Geea, n. gen. (Truxalinae).

This genus runs in the keys of Brunner's 1893 paper to *Parapleurus* on page 121. But it is not very closely allied to that genus, which is now relegated to the synonymy under *Mecossethus* Kelch. The slightly expanded and parallel veined scapular area of the tegmina might lead one to the genus *Pnorisa* in Brunner's key. But there is little relation between the present genus and that African genus of smaller locusts.

Description, female, the male unknown.—Head with the face rather strongly retreating; fastigium of the vertex slightly acute-angulate apically, extending beyond the eyes a distance equal to about its own width, dorsally sulcate, without median carinae, the margins obtuse; fevolae absent; frontal costa with sides parallel above the ocellus, below which point they diverge moderately to the clypeus, which they barely reach; above the ocellus the costa is not at all sulcate, below and at the ocellus very moderately so; occiput moderately swollen, smooth; antennae triquetrous and slightly flattened basally, beyond becoming cylindrical. Pronotum scarcely longer than the head, without lateral carinae and with median carina distinct only on the metanotum, and there very slight; disk rounded, anterior margin roundly truncate, the posterior margin obtuse-angulate, the tip rounded; lateral lobes subquadrate, the lower-posterior angle rectangular; meso- and metasternal interspaces quadrate. Abdomen with the valves of the ovipositor well exerted, the scoop of the upper valves about as long as deep; supra-anal plate dorsally roundly convex, apically semicircularly rounded; cerci a little more than twice as long as basally broad. Organs of flight fully developed, exceeding somewhat the tips of the posterior femora; tegmina apically rounded with-

out intercallary vein, scapular area very slightly expanded, the veins parallel; wings unicolorous, with veins not swollen. Legs moderately slender; all femora unarmed both above and below, the geniculations rounded; tibiae spined above only, the posterior ones with twelve to fourteen spines in the outer series, none next the apical spur.

Type.—*Geea conspicua*, Caudell.

***Geea conspicua*, n. sp.**

Description, female, the male unknown.—This is a large showy locust of a green and black, or dark brown, color in strong contrast. The entire body is blackish above, growing lighter laterally, the clypeus and lower part of the head greenish. the breast and lower surface of the abdomen brownish; antennae, of which all but 11 mm. of the basal portion is missing, entirely piceous and the eyes brown; pronotal disk with a moderately broad median stripe which continues slightly on to the occiput, vanishing before reaching the eyes; the eyes are narrowly margined with yellow and the anterior aspect of the vertex is of the same color, and a streak of yellow extends down each side of the face, from the base of the antennae to the outer margins of the clypeus; ocelli red. Tegmina almost entirely membranous, slightly coriaceous basally, dark brown in color except the anal margin, which is bright green for the entire length, reaching to near the tip of the tegmina, wings uniformly hyaline, the membrane made dusky by innumerable microscopic black specks, and a slight greenish tinge along the anal margin; the veins black. Fore and middle legs bluish green, the femora yellowish ventrally; hind femora green on the outer face, yellowish beneath and on the inner side, the apex black and with a preapical black band; hind tibiae dark blue with a broad subbasal greenish yellow band, the spines light in the basal half and piceous in the apical half; tarsi light yellowish with slight dark variegation.

Length, pronotum, 7 mm.; tegmina, 35 mm.; posterior femora, 22 mm.

Described from a single female, the type.

Type in Collection U. S. National Museum.

Catalogue No. 22975.

***Phlaeoba brachyptera*, n. sp. (Truxalinae).**

The abbreviated wings of this species will serve to distinguish it from the other members of the genus, to none of which it appears very closely allied.

Description, male and female.—General color wood-brown. Head about as long as the pronotum in the male, noticeably shorter in the female; vertex acuteangulate in male, rectangulate in female, extending beyond the eyes a distance a little greater than the interocular space, dorsally shallowly sulcate in front of the eyes, convex posterior of that point, the transition from the concave to convex being sudden and conspicuous; there is a distinct median carina extending for the entire length of the concave portion of the vertex and continued some distance back on to the convex portion; face very rapidly retreating in the upper part, more gradually below; frontal costa persistent and very narrow, expanding somewhat below, the sides about as elevated as the lateral facial

carinae, with which they are subparallel; eyes about one and one-half times as long as broad, diagonally situated, when viewed dorsally, and brown in color, obscurely mottled with darker; antennae very moderately ensiform, longer than the head and pronotum together. Pronotum with median and lateral carinae, the latter parallel to near the anterior margin of the disk, where they diverge briefly; anterior margin of pronotal disk truncate, the posterior margin obtuse angulate; lateral lobes subquadrate. Organs of flight more abbreviated than in the other species of the genus, falling considerably short of the tips of the posterior femora, in male scarcely passing the middle of the hind femora, in the female attaining to about the base of the apical third; tegmina a little longer than the wings, the tips rounded, not acuminate, the costal margin moderately expanded subbasally; no distinct intercallary vein, though such is indicated by a disconnected median series of veinlets; wings hyaline with the longitudinal veins black, the costal and apical areas being somewhat infuscated. Legs slender, brown; hind femora moderately swollen in basal half, the dorsal margin carinate and with a few dark specks, unarmed both above and below, the geniculations blackish, the angles briefly angulate, a sharp median point terminating the femora apically; hind tibiae brown with a bluish tint, the spines ten or eleven on each side, and with the apical half piceous. Supraanal plate of male elongate rectangular, very slightly and briefly sulcate longitudinally above; subgenital plate narrowly pointed above; cerci simple and pointed in both sexes, more elongate in the male, where it is fully four times as long as basally broad; last dorsal segment of abdomen in female elongate, above basally flattened and laterally carinate, mesially shallowly concave; last ventral segment elongate, broader behind, with a barely noticeable median carina, the posterior margin truncate with a median brief obscure tooth projecting between the lower valves of the ovipositor, the lateral margins of this segment are posteriorly rounded; valves of ovipositor well exerted, unarmed, the scoop of the upper ones comprising about half the length.

The anal field of the tegmina and the disk of the pronotum in the male are lighter colored than the rest of the ground color, giving a general appearance of a broad dorsal stripe; this may probably be true also in some females, though in the single specimen of that sex now available for study it is not. The lateral lobes of the pronotum in two of the three males examined are blackish above, especially bordering the lateral carinae, while in the female and the third male this is true only to a lesser extent. There is a narrow and usually obscure postocular dark stripe present on the head, and there is sometimes a greenish tint on the sternum and on the lower surface of the fore and middle femora and tibiae.

Length, pronotum, male, 4 mm., female, 5.5 mm.; antennae, male and female, 12-13 mm.; tegmina, male, 10 mm., female, 12.5 mm.; posterior femora, male, 11 mm., female, 15 mm.

Described from three males, type and paratypes A and B, and one female, allotype.

Type, allotype and paratype A in Collection U. S. National Museum. Paratype B returned to Prof. Gee.

Catalogue No. 22973, U. S. N. M.

Chrysochraon anomopterus, n. sp. (Truxalinae).

Description, male, female unknown.—Very like *japonicus* Bolivar and *genicul-
aribus* Shiraki, but does not agree with either sufficiently well to be considered
identical. It differs from both the above mentioned species in lacking a longi-
tudinal stripe of brown on the sides, the entire insect being an almost uniform
brownish yellow color, faint indications of dorsal and lateral longitudinal stripes
on the head, and the genicular arcs of the hind femora are barely darkened; the
spines of the tibiae are black in the apical half; there are no spines on the femora;
the hind tibiae slightly more clear yellow than the rest of the insect. The

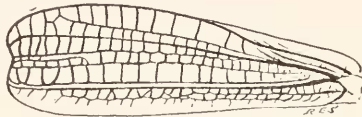


FIG. 1—Tegmen of *Chrysochraon anomopterus*.

antennae are noticeably flattened in the basal third and are longer than the head and thorax. The tegmina are much broadened in the apical half and the tip truncate and mesially notched, as shown in the accompanying figure; the hind wings are aborted, being decidedly shorter than the thorax. The cerci are simple, cylindrical and pointed, as long as the flat triangular apically pointed supraanal plate; subgenital plate with the tip broken off. Mesosternal interspace more than twice as long as broad, the metasternal lobes but little separated.

Length, pronotum, 4 mm.; antennae, about 10 mm.; tegmina, 12.5 mm.; hind femora, 13 mm.

Described from a single male, the type.
Type in Collection U. S. National Museum.
Catalogue No. 22974, U. S. N. M.

Catantops viridifemoratus, n. sp. (Acridinae).

This rather pretty grasshopper is placed in the above already unwieldy genus with considerable doubt. It runs to that genus in the keys of Brunner, however, and the specimens show no characters incompatible with those of *Catantops*.

Description, male and female.—General color brownish. Head greenish brown with broad black postocular bands and some small maculations on the occiput, varying in size, position and number, sometimes forming a rather uniform dorsal infuscation; eyes large and globose, especially in the male where they are but a little longer than broad while in the female they are almost half as long again as broad; frontal costa extending almost to the clypeus, sulcate only at and below the ocellus, the sides parallel, or converging slightly at the ocellus; interocular space approximately as broad as the frontal costa, slightly narrower in the male than in the female; vertex lightly sulcate above, without median carina, anteriorly meeting the face roundly, in the male with a scarcely

perceptible angulation; antennae of female slightly compressed, yellowish brown in color and about twice as long as the pronotum, in the male absent from the single specimen seen. Pronotum yellow greenish brown on the sides and a little darker above, the sites of the lateral carinae marked by a broad black stripe continuous with the postocular stripes of the head; pronotal disk truncate anteriorly, roundly angulate posteriorly, rounding into the moderately elongate lateral lobes without forming lateral carinae except very bluntly so on the metazona; median carinae very slight, especially in the female, a little more distinct in the male; prosternal spine conical, apically broadly rounded; mesosternal interspace very slightly longer than broad in the male, a little broader than long in the female. Legs moderately slender, the hind femora moderately swollen basally; the color of the legs in general is greenish, the outer face of the hind femora very noticeably so, the tibiae with a bluish cast, those of the posterior legs being decidedly blue; the posterior femora apically and corresponding tibiae basally piceous, the femora marked dorsally by a broad medial and pre-apical band, sometimes somewhat obscured but usually very noticeable, even conspicuous; spines of hind tibiae black in apical half, yellowish basally, ten to twelve in the outer series, the basal two or three minute. Organs of flight fully developed, but barely or scarcely attaining to the tips of the posterior femora; elytra brown, the costal margin basally infuscated, intercallary area narrow and with a distinct intercallary vein; wings moderately and uniformly fuliginous, the veins black. Abdomen greenish yellow, with a few black markings apically; supraanal plate of male triangular, black on the greater part of the median portion, the tip and base only light and with a narrow median longitudinal stripe, broadly sulcate medially in the basal third and narrowly in the apical third, and more broadly so for the entire length on each side of the medial furrows; on each side of the narrow apical median sulcation is a pair of raised longitudinal carinae, short and black; subgenital plate with the upper margin thin and forming a brief, acute, depressed and posteriorly directed point, the apical half of this plate is mottled with blackish; fercula mere rounded lobes shorter than the last dorsal abdominal segment from which they arise, but rather conspicuous from their color, which is black, in decided contrast to the yellowish color of the surface beneath them; cerci of male simple, apically clavate, shaped as shown in the figure (Fig. 2), the whole cercus extending slightly beyond the tip of the supraanal plate and is black on the apically expanded portion, except along the lower margin; just beyond the tip of the supraanal plate; between it and the tip of the subgenital plate, the integument of the abdomen forms an erect blunt tubercle; cerci of female about twice as long as basally broad, conical, usually tapering more rapidly in the basal half, apically narrowly rounded; valves of ovipositor well exerted, the margins without serrations, or with very rounded



FIG. 2.—Cercus of *Catantops viridifemoratus*.

ones on the upper valves, where the scoop is about as long as the basal portion; last ventral segment of the abdomen of the female longer than broad, with a median apical angulation projecting between the lower valves of the ovipositor, and on each side of this median angle there are emarginations forming a flattened triangular lobe on each side, overlying the lateral apophysegal plates.

Length, antennae, male ? mm., female, 14 mm.; pronotum, male, 5 mm., female, 7.5 mm.; tegmina, male, 15.5 mm., female, 20 mm.; posterior femora, male, 13 mm., female, 16.5 mm.

Described from one male, type, and five females, allotype and paratypes A to D.

Type, allotype and paratypes A and B in Collection U. S. National Museum; paratypes C and D returned to Prof. Gee. Catalogue No. 22972 U. S. N. M.

***Drymadusa mokanshanensis*, n. sp. (Tettigonidae, Decticinae).**

Description, male and female.—Color almost uniformly yellowish green, probably green in life. Head as broad as the pronotum; fastigium of the vertex narrower than the basal segment of the antennae, from a front view triangular, the narrow point touching the fastigium of the front; basal segment of the antennae very broad, the second intermediate between the basal and the succeeding ones, which are cylindrical and very gradually growing smaller towards the tip of the antenna; the ends are broken from the antennae of the only two specimens known; eyes moderately protuberant, semicircular and brown in color. Pronotum with lateral carina roundly present only on the metanotum, where the disk is flat, the rest being rounded, the anterior margin truncate, the posterior margin broadly rounded; lateral lobes about as high as broad, the lower margin inclined anteriorly, the posterior-inferior angle rounded, the humeral sinus shallow; prosternal spines long and sharp; meso- and metasternal lobes pointed, the first more than twice as long as basally broad, the latter scarcely longer than broad. Abdomen plump, slightly compressed; supraanal plate of male with an apical u-shaped notch, the resulting points triangular, that of the female small, triangular and dorsally sulcate, with a black spot situated mesially; cerci of male sub-cylindrical, tapering, apically gently incurved, the whole five or six times as long as the basal width, a prominent broad triangular tooth situated on the inner side at about the basal fourth, the tip of this tooth being black, sharp and decurved; cerci of female simple, cylindrical, gradually tapering to a point and five or six times as long as basally broad; subgenital plate of male forming a long hollow, perpendicular sided scoop, ventrally concave with a low median carinae and more prominent margins, the tip triangularly notched mesially and bearing a pair of simple cylindrical tapering styles about six times as long as the basal width; subgenital plate of the female much smaller than that of the male, flat below, the apex broadly notched and turned outward so as to form a diagonal lateral furrow; ovipositor not quite three-fourths as long as the posterior femora, gently decurved and with the tip diagonally truncate. Legs slender; fore tibiae with four long dorsal spines on the outer margin in the male and three in the female; middle tibiae with several dorsal spines on each margin in both sexes; hind tibiae with many dorsal spines, all of the tibiae being armed below on both

margins, all spines black at the tip and along the lower margins, those of the posterior ones more conspicuously black; anterior and intermediate femora with blunt blackish teeth on the anterior margins only, the posterior femora long and strongly swollen in the basal two-fifths, armed below on both margins with a few short piceous teeth; plantula of posterior tarsus free but short, about one half as long as the basal tarsal segment. Organs of flight fully developed, extending to or beyond the tips of the posterior femora; tegmina broader in the male than in the female, greenish in both sexes and with the main veins in the female blackish basally; tympanum of male about as long and broad as the pronotum; wings clear hyaline with a greenish cast along a narrow costal strip in the apical half of the wing, the longitudinal veins mostly dark colored.

Length, pronotum, male, 8 mm., female, 9.5 mm.; tegmina, male, 47 mm., female, 42 mm.; posterior femora, male, 34 mm., female, 36 mm.; cerci, male, 4.5 mm., female, 2.75 mm.; anal stylets, male, 2.75 mm.; ovipositor, 23 mm.

Described from one male and one female, type and allotype.

Type and allotype in Collection of the U. S. National Museum.

Catalogue No. 22976.

The collection contained an adult male and a male nymph of another species of this same genus which seems allied to the one described above, except that the cerci and anal stylets are shorter and there are other characters, both structural and colorational, that indicate specific distinctness from *mokanshanensis*. The absence of all legs, except the right fore leg, from the only adult specimen makes determination difficult, and it is deemed best to leave this form unplaced until more and better preserved material is obtained.

NOTES ON THE ANCESTRY OF THE HYMENOPTERA.

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To any one who makes a study of a large number of structures from different parts of the body, in attempting to determine the origin and affinities of the various orders of insects, it very soon becomes apparent that it is utterly impossible to arrange the lines of descent of the insectan orders in a dichotomously branching tree drawn in one plane, since *several* orders are frequently connected by mutual bonds of relationship, and many lines of descent may converge toward a common ancestry, which is anatomically intermediate between two or more primitive groups, and is related to the one scarcely less closely than to the others. If we disregard the factor of time (*i. e.*, whether one order was derived from the common ancestral group sooner, or later, than certain others derived from the same ancestral group) and consider the ancestral group from which the others were derived as merely an anatomical "point of origin," the